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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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OLIFF & BERRIDGE, PLC.
P.O. BOX 19928
ALEXANDRIA, VA 22320

EXAMINER

THANGAVELU, KANDASAMY

ART UNIT PAPER NUMBER

2123

DATE MAILED: 05/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/973,786

Applicant(s)

JACKSON ET AL.

Examiner

Kandasamy Thangavelu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 March 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,6-10,14 and 15 is/are rejected.
- 7) ☒ Claim(s) 1-13 and 16-18 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 11 March 2005.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. This communication is in response to the Applicants' Response mailed on March 11, 2005. Claims 1 and 3-18 were amended. Claims 1-18 of the application are pending. This office action is made non-final.

Claim Objections

2. The following is a quotation of 37 C.F.R. § 1.75 (d)(1):

The claim or claims must conform to the invention as set forth in the remainder of the specification and terms and phrases in the claims must find clear support or antecedent basis in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description.

3. Claims 14-18 are objected to because of the following informalities:

In Claim 14, Lines 11-12, "a controller that uses at least the at least one more successful control system models to control the multiple actuator-sensor smart matter dynamical control system" appears to be incorrect and it appears that it should be "a controller that uses the at least one more successful control system model to control the multiple actuator-sensor smart matter dynamical control system".

Claims objected to but not specifically addressed are objected to based on their dependency on an objected claim.

Appropriate corrections are required.

Claim Rejections - 35 USC § 101

4. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claim 7 is rejected under 35 U.S.C. 101 because the claimed invention lacks patentable utility.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. Claims 1, 6, 8, 9 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Jacques** (U.S. Patent Application 2003/0028266) in view of **Raeth et al.** (U.S. Patent Application 2003/0065409), and further in view of **Phillips et al.** (U.S. Patent 6,473,084).

8.1 **Jacques** teaches tuning control parameters of vibration reduction and motion control systems for fabrication equipment and robotic systems. Specifically as per claim 14, **Jacques** teaches a dynamical controller of a multiple actuator-sensor smart matter dynamical control system (Page 1, Para 0001 and Para 0005; Page 2, Para 0010; page 3, Para 0019 and Para 0020; Page 4, Para 0032); comprising:

a controller that uses at least the at least one more successful control system models to control the multiple actuator-sensor smart matter dynamical control system (Page 3, Para 0020; Page 3, Para 0022).

Jacques teaches a prediction circuit usable to predict a future behavior of the multiple actuator-sensor smart matter dynamical control system (Page 3, Para 0019, Para 0020 and Para 0022; Page 2, Para 0010; Page 4, Para 0032). **Jacques** does not expressly teach using a plurality of control system models to predict a future behavior. **Raeth et al.** teaches using a plurality of control system models to predict a future behavior (Page 1, Para 0012), because that allows each prediction model to receive data from one of the sensors and predict the outputs for some future data sample (Page 1, Para 0012). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the controller of **Jacques** with the controller of

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Raeth et al. that included using a plurality of control system models to predict a future behavior.

The artisan would have been motivated because that would allow each prediction model to receive data from one of the sensors and predict the outputs for some future data sample.

Jacques teaches a success determination circuit usable to determine at least one control system model (Page 3, Para 0020; Page 3, Para 0022). **Jacques** does not expressly teach a success determination circuit usable to determine at least one control system model which is more successful than at least one other model in the plurality of models in predicting the future behavior of the multiple actuator-sensor smart matter dynamical control system. **Phillips et al.** teaches a success determination circuit usable to determine at least one control system model which is more successful than at least one other model in the plurality of models in predicting the future behavior of the multiple actuator-sensor smart matter dynamical control system (CL5, L10-28; CL5, L35-47; CL7, L9-23; CL8, L3-5), because that allows ranking based on performance resulting in more meaningful ranking (CL7, L15-17) and ranking based on relative accuracies in individual prediction events (CL8, L3-5). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the controller of **Jacques** with the controller of **Phillips et al.** that included a success determination circuit usable to determine at least one control system model which is more successful than at least one other model in the plurality of models in predicting the future behavior of the multiple actuator-sensor smart matter dynamical control system. The artisan would have been motivated because that would allow ranking based on performance resulting in more meaningful ranking and ranking based on relative accuracies in individual prediction events.

Jacques does not expressly teach a weight increasing circuit usable to increase the weight of the at least one more successful control system model relative to the at least one other model. **Phillips et al.** teaches a weight increasing circuit usable to increase the weight of the at least one more successful control system model relative to the at least one other model (CL5, L41-42; CL11, L46-52), because that allows more accurate predictions by using a weighted average of forecasts (CL6, L6-8; CL11, L46-52). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the controller of **Jacques** with the controller of **Phillips et al.** that included a weight increasing circuit usable to increase the weight of the at least one more successful control system model relative to the at least one other model. The artisan would have been motivated because that would allow more accurate predictions by using a weighted average of forecasts.

8.2 As per Claims 1 and 9, these are rejected based on the same reasoning as Claim 14, supra. Claims 1 and 9 are a method claim and a dynamic controller with a means for claim reciting the same limitations as Claim 14, as taught throughout by **Jacques**, **Raeth et al.** and **Phillips et al.**

8.3 As per claims 6 and 8, **Jacques**, **Raeth et al.** and **Phillips et al.** teach the method of claim 1. **Jacques** teaches repeating the predicting, determining and increasing steps within one or more selectable time periods (Fig. 1, Fig. 3 and Fig. 4); and the method of claim 1, comprising adding new models (Page 3, Para 0019 and Para 0020).

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9. Claims 2, 10 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Jacques** (U.S. Patent Application 2003/0028266) in view of **Raeth et al.** (U.S. Patent Application 2003/0065409), and further in view of **Phillips et al.** (U.S. Patent 6,473,084) and **Spoerre et al.** (U.S. Patent 5,602,761).

9.1 As per claim 15, **Jacques**, **Raeth et al.** and **Phillips et al.** teach the controller of claim

14. **Jacques** does not expressly teach that the plurality of control system models comprises N control system models; and each of the N control system models is initially assigned a weight w_i such that $\sum_{i=1}^N w_i = 1$.

Jacques does not expressly teach that the plurality of control system models comprises N control system models. **Raeth et al.** teaches that the plurality of control system models comprises N control system models (Page 1, Para 0012), because that allows each prediction model to receive data from one of the sensors and predict the outputs for some future data sample (Page 1, Para 0012). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the controller of **Jacques** with the controller of **Raeth et al.** that included the plurality of control system models comprising N control system models. The artisan would have been motivated because that would allow each prediction model to receive data from one of the sensors and predict the outputs for some future data sample.

Jacques does not expressly teach that each of the N control system models is initially assigned a weight w_i . **Phillips et al.** teaches that each of the N control system models is initially assigned a weight w_i (CL5, L41-42; CL11, L46-52), because that allows more accurate predictions by using a weighted average of forecasts (CL6, L6-8; CL11, L46-52). It would have

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been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the controller of **Jacques** with the controller of **Phillips et al.** that included each of the N control system models being initially assigned a weight w_i . The artisan would have been motivated because that would allow more accurate predictions by using a weighted average of forecasts.

Jacques does not expressly teach that initially assigned weight w_i are selected such that $\sum_{i=1}^N w_i = 1$. **Spoerre et al.** teaches that initially assigned weight w_i are selected such that $\sum_{i=1}^N w_i = 1$ (CL9, L17-52; CL9, L40-43), because as per **Phillips et al.** that allows obtaining more accurate predictions using a weighted average of forecasts (CL6, L6-8; CL11, L46-52). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the controller of **Jacques** with the controller of **Spoerre et al.** that included initially assigned weight w_i being selected such that $\sum_{i=1}^N w_i = 1$. The artisan would have been motivated because that would allow obtaining more accurate predictions using a weighted average of forecasts.

9.2 As per Claims 2 and 10, these are rejected based on the same reasoning as Claim 15, supra. Claims 2 and 10 are a method claim and a dynamic controller means for claim reciting the same limitations as Claim 15, as taught throughout by **Jacques**, **Raeth et al.**, **Phillips et al.** and **Spoerre et al.**

Allowable Subject Matter

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10. Claims 3-5, 11-13 and 16-18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

11. Applicant's arguments filed on March 11, 2005 have been fully considered. The arguments with respect to 103 (a) rejections are persuasive.

11.1 As per the applicants' argument that "Jacques, Raeth and Werbos, either individually or in combination, do not disclose or suggest determining at least one control system model which is more successful than at least one other model of the plurality of models in predicting the future behavior of the multiple actuator-sensor smart matter dynamic control system; or increasing a weight of the at least one more successful control system model in the plurality of control system models used to predict future behavior of the multiple actuator-sensor smart matter dynamic control system relative to a weight of the at least one other model, as recited in claim 1, and similarly recited in claims 9 and 14", the examiner has used a new reference **Phillips et al.**

Phillips et al. teaches determining at least one control system model which is more successful than at least one other model of the plurality of models in predicting the future behavior of the multiple actuator-sensor smart matter dynamic control system (CL5, L10-28; CL5, L35-47; CL7, L9-23; CL8, L3-5), because that allows ranking based on performance

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resulting in more meaningful ranking (C17, L15-17) and ranking based on relative accuracies in individual prediction events (CL8, L3-5).

Phillips et al. teaches increasing a weight of the at least one more successful control system model in the plurality of control system models used to predict future behavior of the multiple actuator-sensor smart matter dynamic control system relative to a weight of the at least one other model (CL5, L41-42; CL11, L46-52), because that allows more accurate predictions by using a weighted average of forecasts (CL6, L6-8; CL11, L46-52).

11.2 As per the applicants' argument that "Raeth does not disclose or suggest determining whether one prediction model is more successful than another prediction model; therefore, Raeth does not disclose or suggest determining at least one control system model which is more successful than at least one other model of the plurality of models", the examiner has used a new reference **Phillips et al.** which teaches this limitation as described in Paragraph 11.1 above.

11.3 As per the applicants' argument that "Werbos does not disclose or suggest increasing the weight of one model relative to a weight of another model; Werbos does not disclose or suggest increasing a weight of the at least one more success for control system model in the plurality of control system models relative to a weight of the at least one other model", the examiner has used a new reference **Phillips et al.** which teaches this limitation as described in Paragraph 11.1 above.

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11.4 As per the applicants' argument that "Black does not disclose or suggest determining at least one control system model which is more successful than at least one other model of a plurality of models; or increasing a weight of the at least one more successful control system model relative to a weight of the at least one other model, as recited in claim 1", the examiner has used a new reference **Phillips et al.** which teaches these limitations as described in Paragraph 11.1 above.

11.5 As per the applicants' argument that "Shutic does not disclose or suggest determining at least one control system model which is more successful than at least one other model of a plurality of models; or increasing a weight of the at least one more successful control system model relative to a weight of the at least one other model, as recited in claim 1", the examiner has used a new reference **Phillips et al.** which teaches these limitations as described in Paragraph 11.1 above.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Kandasamy Thangavelu whose telephone number is 571-272-3717. The examiner can normally be reached on Monday through Friday from 8:00 AM to 5:30 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kevin Teska, can be reached on 571-272-3716. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to TC 2100 Group receptionist: 571-272-2100.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'K. Thangavelu', with a large, stylized flourish at the end.

K. Thangavelu
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May 19, 2005